

1970

**OPERATING
SUMMARY**

ORANGEVILLE

water pollution control plant

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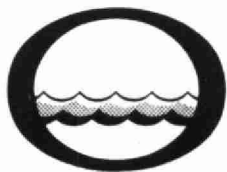
Division of Plant Operations

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Water management in Ontario

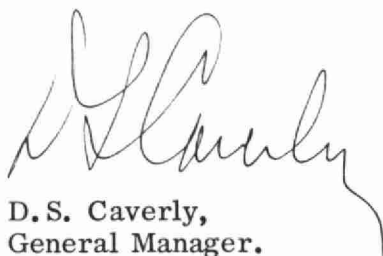
Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 195
Ontario


Once again we have the privilege of submitting to you our latest detailed report on financial progress and technical activity at your water pollution control plant.

The statistical information contained in this annual operating summary will undoubtedly be a useful barometer of efficiency. Of particular interest will be the comments and recommendations of the regional operations engineer, who was intimately connected with day-to-day operation throughout 1970.

Together with the extensive cost data provided, this information should assist greatly in your general understanding of the problems met and dealt with, and in furnishing a yardstick for possible future expansion.



D.S. Caverly,
General Manager.



D.A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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ORANGEVILLE
water pollution control plant

operated for

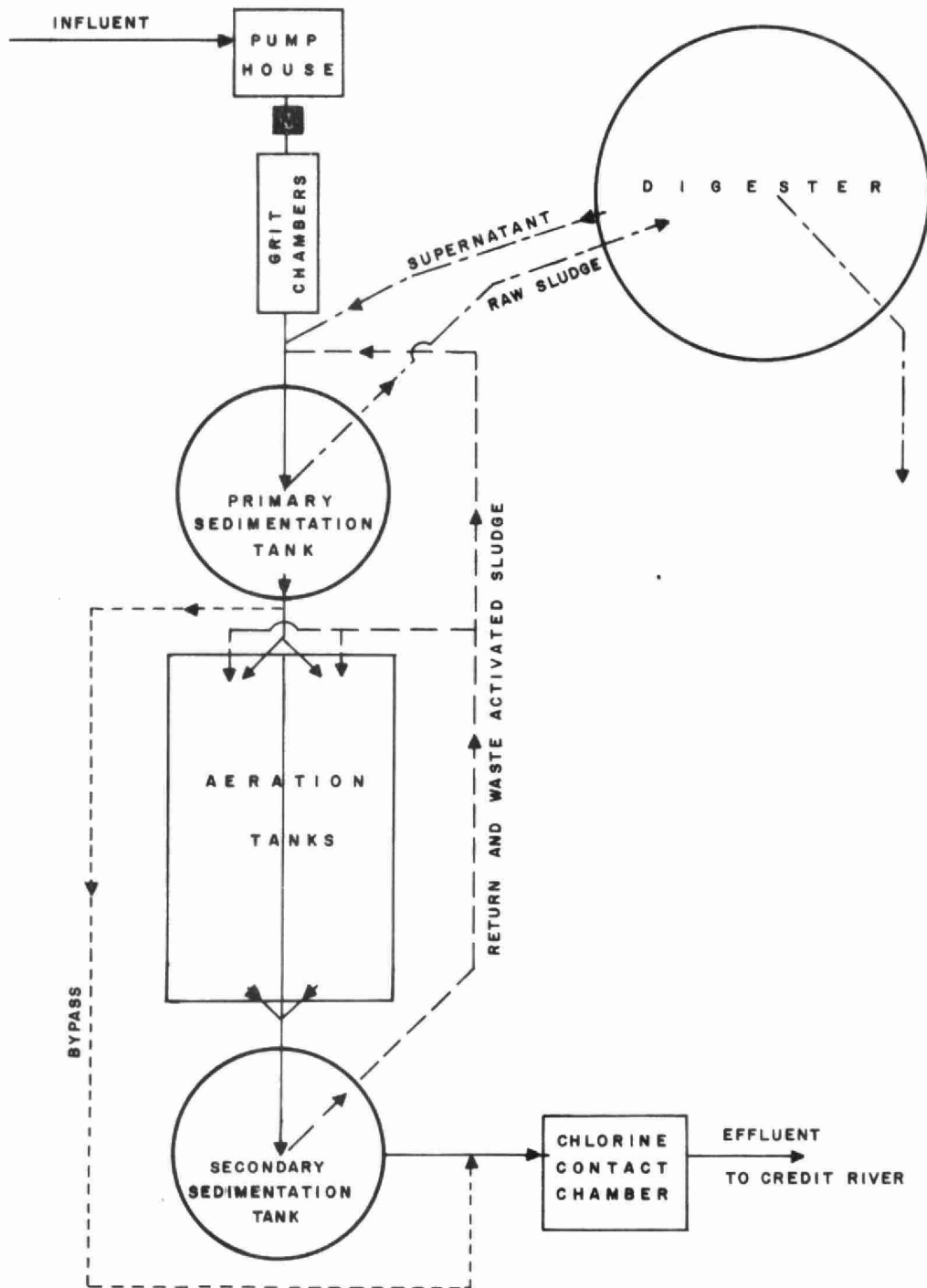
THE TOWN OF ORANGEVILLE

by the

ONTARIO WATER RESOURCES COMMISSION

1970 ANNUAL OPERATING SUMMARY

ORANGEVILLE WATER POLLUTION CONTROL PLANT



DESIGN DATA

PROJECT NO.	2-0208-66	TREATMENT	Activated Sludge
DESIGN FLOW	0.75 mgd	DESIGN POPULATION	7,500
BOD - Raw Sewage	200 mg/l	SS - Raw Sewage	250 mg/l

LIFT PUMPS

Type: Smart-Turner
 Size: Two 300 gpm @ 20' tdh
 One 500 gpm @ 25' tdh

PRIMARY TREATMENT

Grit Removal

Type: Channels, manually cleaned
 Size: Two 25' x 1' 10 3/4" wide
 Flow Velocity: 1 fps @ 0.366' depth

Primary Sedimentation

Type: Spiraflo (peripheral feed)
 Size: One 35' dia x 12' swd (72,000 gal)
 Retention: 2.31 hr
 Loading: Surface, 780 gal/ft²/day
 Weir, 7350 gal/ft/day

SECONDARY TREATMENT

Aeration Tanks

Type: Diffused air; single-pass
 Size: Two 63 X 21 X 12' (198,000 gal)
 Retention: 6.33 hr
 Diffusers: Dorr Inka

Air Supply

Type: Powlesland-Bailey fan
 Size: Two 3200 scfm @ 30" wc

Secondary Sedimentation

Type: Dorr
 Size: One 45' dia x 9.17' swd
 (97,300 gal)
 Retention: 3.12 hrs
 Loading: Surface, 470 gal/ft²/day
 Weir, 5820 gal/ft/day

CHLORINATION

Type: W & T
 Size: One 75 lb/day

Chlorine Contact Chamber

Size: One 29.75 X 12 X 6.92' (15,400 gal)
 Retention: 29.6 min

OUTFALL

- to Credit River

SLUDGE HANDLING

Digestion System - Single-stage

Type: Carter gas mixed, floating
 cover
 Size: One 45' dia x 20' swd (34,500
 cu ft or 215,000 gal)
 Loading: 1.5 lb/cu ft/mo

'70 REVIEW

FLOWS	DAILY FLOW mil gal	OCCURRING IN THE MONTH OF	MONTHLY FLOW mil gal	OCCURRING IN THE MONTH OF
Average	0.76	—	23.1	—
High	1.50	April	37.5	April
Low	0.40	January	18.7	February

GENERAL

The slight increase in flow was further indication of the need for plant expansion. Consultants were hired to determine what expansion measures were required. Construction of the expanded plant is anticipated to begin next year.

It is expected that expansion of the plant will solve the digester cover problem which was mentioned in last year's annual report.

Extensive testing was carried out during the latter part of the year with the Inka aeration system. Once results from these tests have been studied, a final solution to this problem will be forthcoming.

PLANT FLOWS and CHLORINATION

The total flow of 277.6 million gallons was slightly higher than last year's flow. The average daily flow was 0.76 million gallons and the maximum and minimum daily flows were 1.50 million gallons and 0.40 million gallons respectively.

The total chlorine consumption for the year was 12,990 lbs. An average of 47 lbs. of chlorine per million gallons of treated sewage was applied to produce a residual of 0.5 mg/l after 15 minutes contact.

PLANT EFFICIENCY

The average influent and effluent BOD and suspended solids were 110 mg/l, 207 mg/l, 10 mg/l and 17 mg/l respectively. This resulted in an average reduction of 91% BOD and 92% suspended solids.

A total of 322 cu. ft. of grit were removed at the plant during the year.

AERATION

In 1970, an average of 0.8 mgd was treated in the aeration section. The average BOD and suspended solids removals in this section were 81.1% and 87.2% respectively.

SLUDGE DIGESTION and DISPOSAL

A total of 1,800,000 gallons of raw sludge was treated at the plant; 580,000 gallons were digested, 1,310,000 gallons were returned to the plant process as supernatant and 3068 cu. yds. of liquid sludge were disposed of by a sludge contractor.

CONCLUSIONS

With the increased flows, the plant efficiency was maintained. However, from the probability graphs, it can be seen that approximately 33% of the time the effluent BOD concentration is equal to or greater than the Commission's objective and 75% of the time, the effluent suspended solids concentration is equal to or greater than the Commission's objectives.

The probability graph for flows indicates that approximately 53% of the time the flows were equal to or greater than the plant's design capacity.

With these trends in mind, the plant expansion should be completed as soon as possible.

PROJECT COSTS

2-0016-58 NET CAPITAL COST (Final)	\$176,332.46
DEDUCT - Portion financed by CMHC/MDLB (Final)	
Long Term Debt to OWRC	<u>\$176,332.46</u>
Debt Retirement Balance at Credit (Sinking Fund) December 31, 1970	\$ <u>51,150.69</u>
Net Operating	\$ 33,714.01
Debt Retirement	3,558.00
Reserve	638.54
Interest Charged	<u>9,739.18</u>
TOTAL	\$ <u>47,649.73</u>

RESERVE ACCOUNT

Balance @ January 1, 1970	\$ 11,696.59
Deposited by Municipality	638.54
Interest Earned	<u>769.65</u>
	\$ 13,104.78
Less Expenditures	<u>-</u>
Balance @ December 31, 1970	\$ <u>13,104.78</u>

PROJECT COSTS

2-0208-66	
NET CAPITAL COST (Final)	\$513,283.35
DEDUCT - Portion financed by	340,766.31
CMHC/MDLB (Final)	<u>340,766.31</u>
Long Term Debt to OWRC	<u>\$172,517.04</u>
Debt Retirement Balance at Credit	
(Sinking Fund) December 31, 1970	\$ <u>6,229.82</u>
Net Operating	\$ -
Debt Retirement	3,468.00
Reserve	4,595.13
Interest Charged	<u>13,043.49</u>
TOTAL	\$ <u>21,106.62</u>

RESERVE ACCOUNT

Balance @ January 1, 1970	\$ 4,374.97
Deposited by Municipality	4,595.13
Interest Earned	<u>398.74</u>
	\$ 9,368.84
Less Expenditures	<u>-</u>
Balance @ December 31, 1970	\$ <u>9,368.84</u>

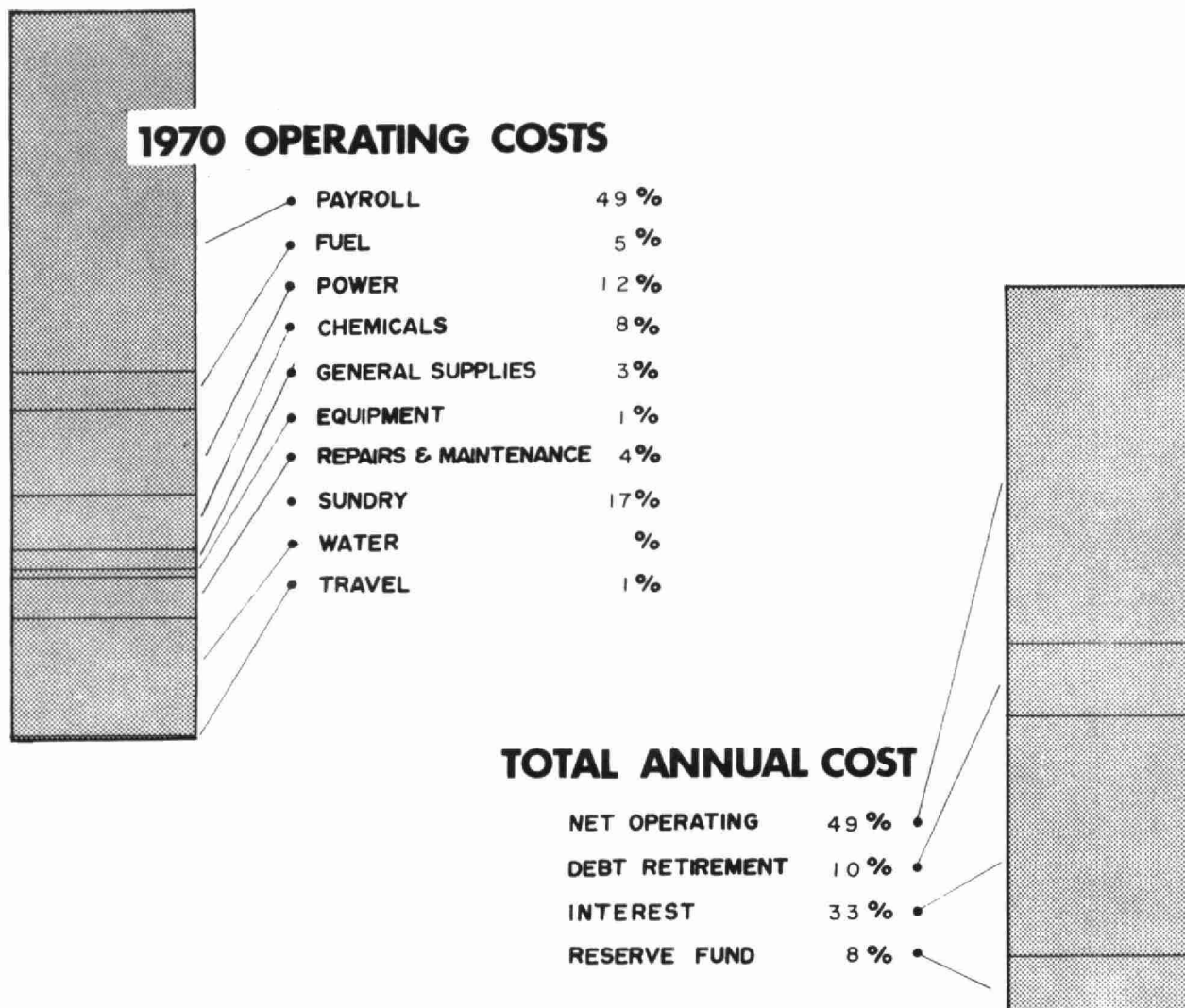
MONTHLY OPERATING COSTS

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY *	TRAVEL	WATER
JAN	2309.54	1701.73	-	23.87	209.51	-	30.00	-	-	344.43	-	- -
FEB	2543.99	1227.12	-	389.69	214.22	220.50	161.26	5.00	38.86	287.34	-	-
MAR	2253.93	1256.97	-	-	378.25	-	25.60	-	561.80	31.31	-	-
APR	2761.95	1275.20	-	-	596.23	220.50	69.25	-	21.71	565.86	13.20	-
MAY	3040.93	1314.45	-	204.18	387.76	290.59	104.42	436.63	277.92	24.98	-	-
JUNE	2581.84	1205.56	148.07	334.30	352.80	-	61.24	-	-	475.84	4.03	-
JULY	3299.32	1159.35	329.32	149.41	303.71	290.59	160.38	40.58	6.54	774.99	84.45	-
AUG	2913.02	1788.11	325.90	143.66	321.75	145.30	65.49	-	7.65	106.12	9.04	-
SEPT	5386.70	1185.04	-	106.14	336.67	145.30	62.10	-	57.98	1485.07	8.40	-
OCT	2574.77	1177.59	-	95.14	340.17	336.93	89.74	-	218.80	316.40	-	-
NOV	2659.85	1332.99	-	-	346.70	290.59	58.47	-	57.30	560.66	13.14	-
DEC	3311.67	1168.14	-	288.51	377.58	581.18	167.20	-	25.42	541.93	161.71	-
TOTAL	33637.51	15792.25	803.29	1734.90	4165.35	2521.48	1055.15	482.21	1273.98	5514.93	293.97	-

BRACKETS INDICATE CREDIT

* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE \$3,505.50

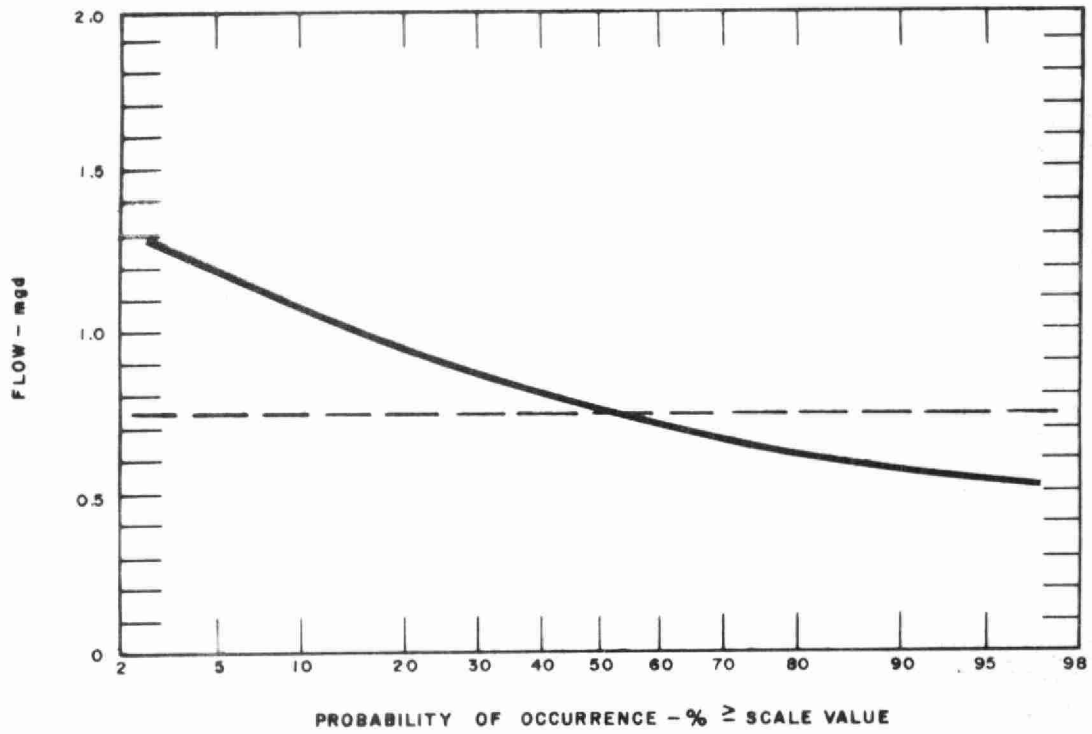
Note: Total does not include year end adjustments.



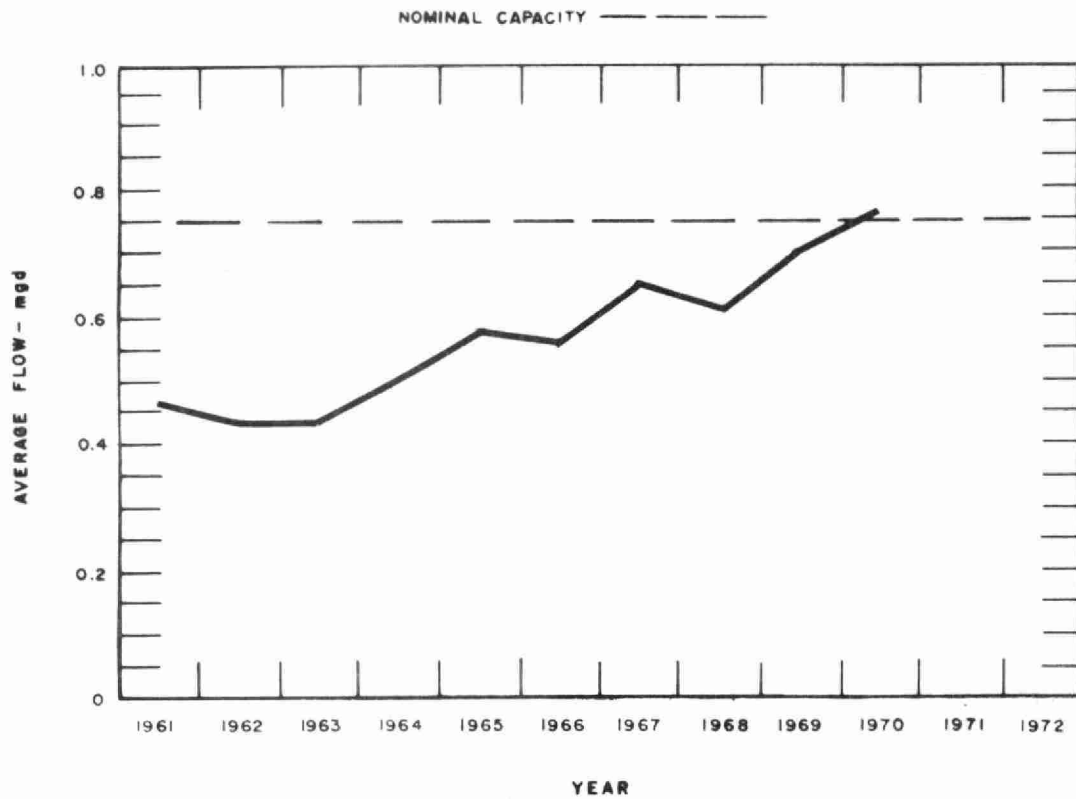
Yearly Operating Costs

YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1966	209.50	\$14,956.60	\$ 71.39	7 cents
1967	240.62	15,203.20	63.18	9 cents
1968	233.14	19,337.78	82.94	8 cents
1969	271.20	26,579.37	98.01	7 cents
1970	277.6	33,637.51	121.17	12 cents

PROCESS DATA

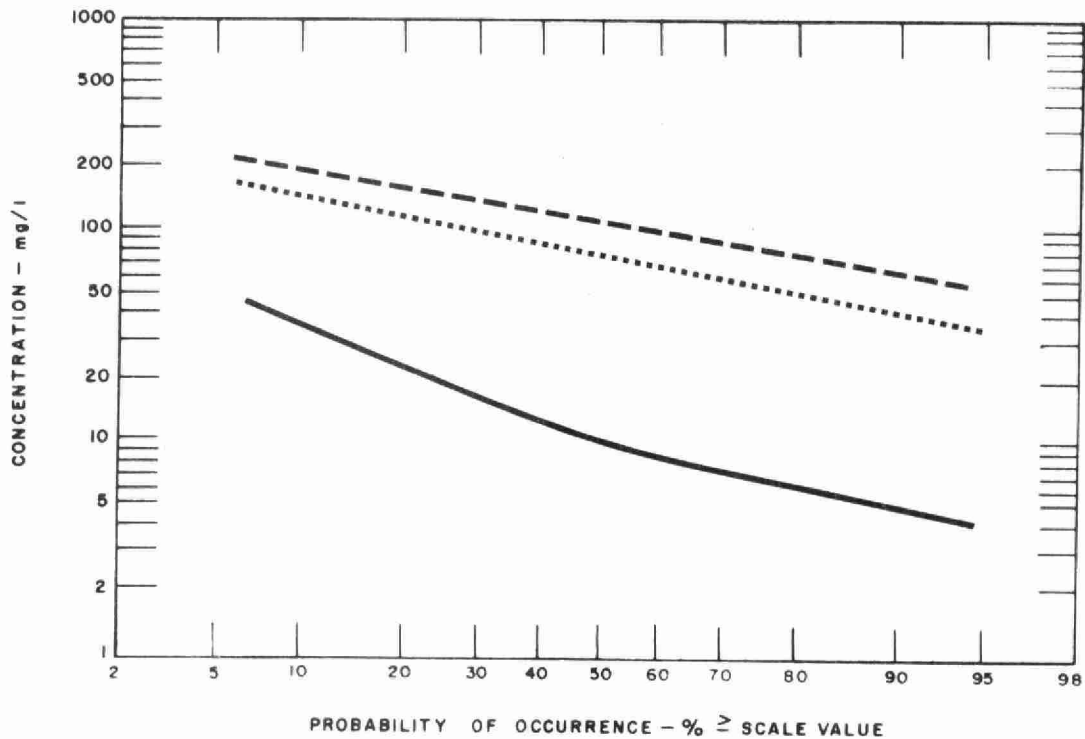


FLOWS

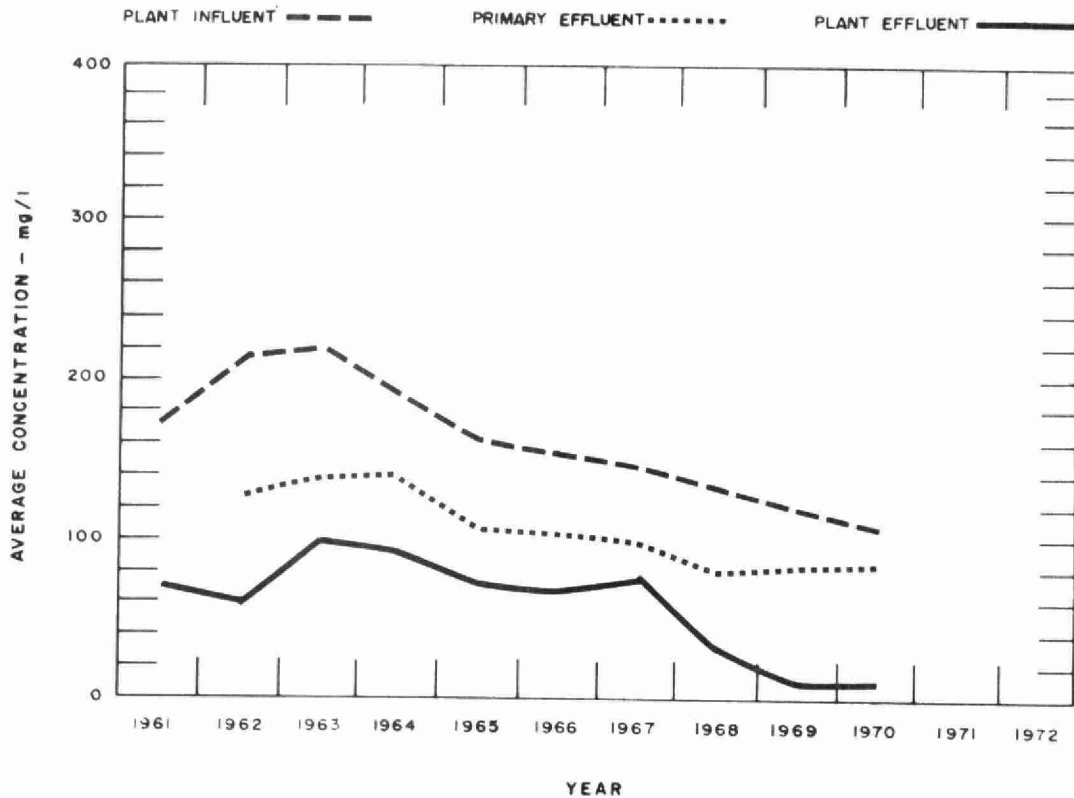


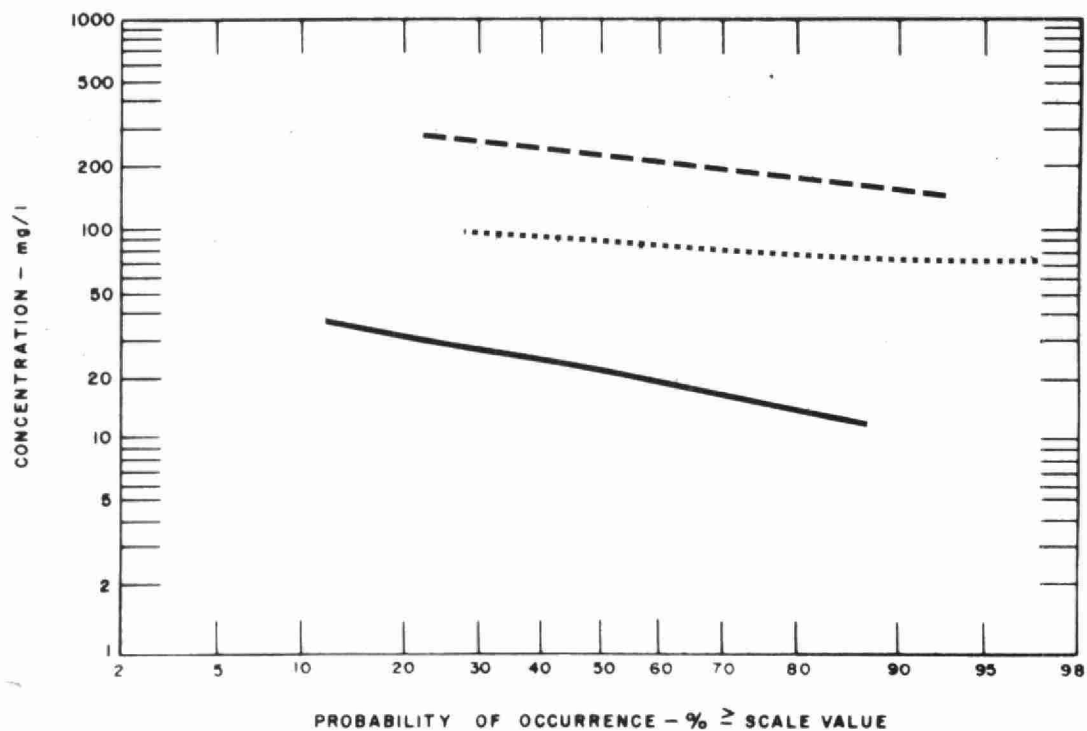
PLANT FLOWS and CHLORINATION

MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED 10 ³ pounds	DOSAGE mg/l
JAN	19.3	.62	.9	.4	1.00	5.2
FEB	18.7	.67	.9	.6	.87	4.7
MAR	24.2	.78	1.0	.6	1.01	4.2
APR	37.5	1.25	1.5	1.0	1.07	2.9
MAY	28.1	.91	1.2	.7	1.09	3.9
JUNE	22.0	.73	.9	.6	1.02	4.6
JULY	21.8	.70	.9	.6	1.09	5.0
AUG	18.8	.61	.8	.5	1.18	6.3
SEPT	19.8	.66	1.1	.5	1.12	5.6
OCT	22.4	.72	1.0	.6	1.14	5.1
NOV	24.3	.81	1.1	.7	1.18	4.9
DEC	20.7	.67	1.2	.7	1.22	5.9
TOTAL	277.6	-	-	-	12.99	-
AVERAGE	-	.76	-	-	1.08	4.7

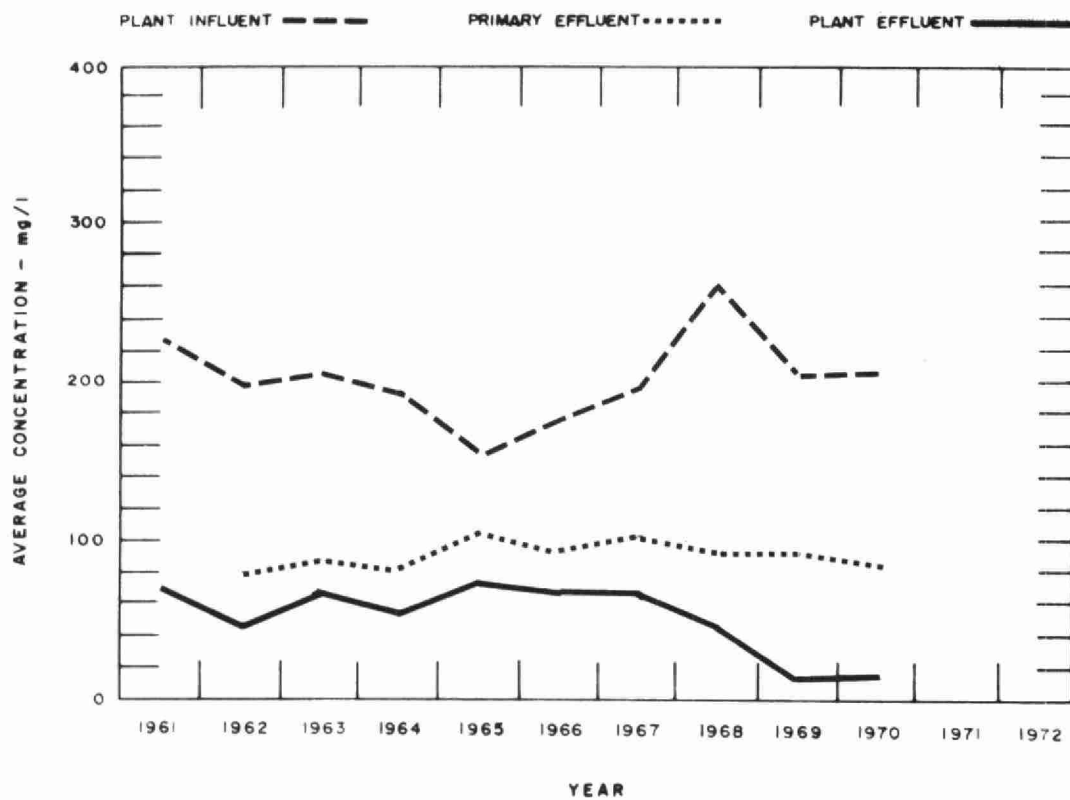


BIOCHEMICAL OXYGEN DEMAND





SUSPENDED SOLIDS



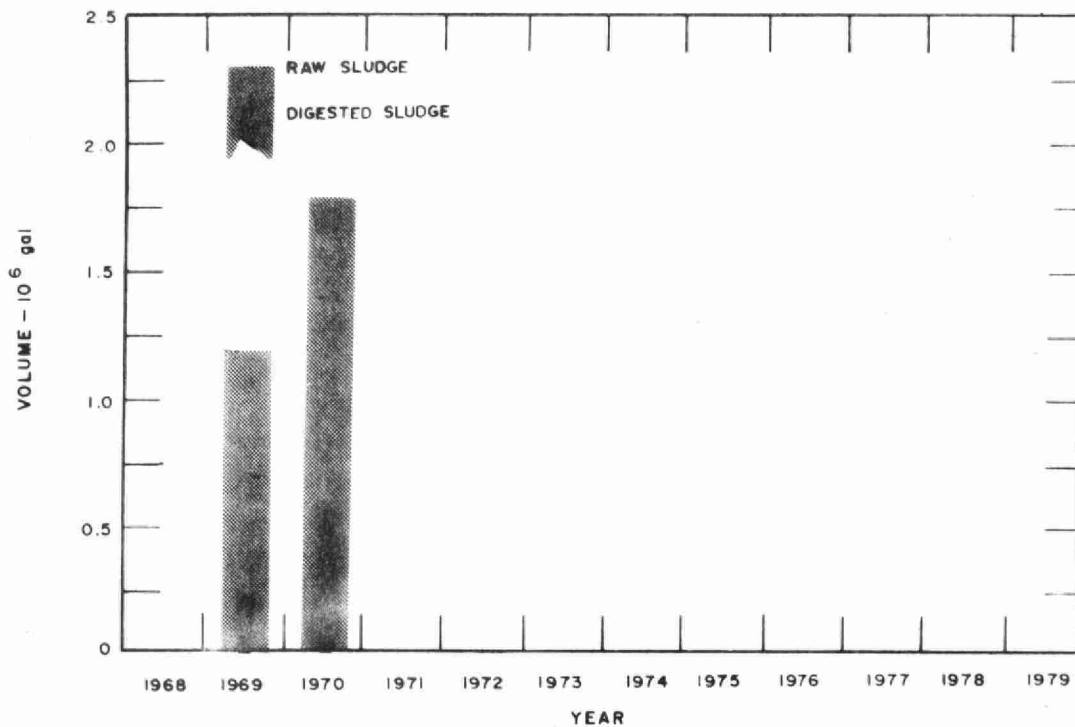
PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND						SUSPENDED SOLIDS						GRIT REMOVED cu ft
	INFLUENT		EFFLUENT		REDUCTION		INFLUENT		EFFLUENT		REDUCTION		
	n	mg/l	n	mg/l	%	10 ³ pounds	n	mg/l	n	mg/l	%	10 ³ pounds	
JAN	1	190	1	13	93	34	1	230	1	25	89	40	0
FEB	1	110	1	7	94	19	1	180	1	20	89	30	0
MAR	1	180	1	11	94	41	1	250	1	15	94	57	28
APR	2	82	2	5	94	29	2	107	2	18	83	33	76
MAY	1	85	1	5	94	10	1	420	1	10	98	115	36
JUNE	0	-	0	-	-	-	0	-	-	-	-	-	0
JULY	4	72	2	23	68	11	4	175	2	23	87	33	88
AUG	1	110	1	6	94	20	1	190	1	10	95	34	40
SEPT	1	95	1	7	93	17	1	230	1	5	98	45	54
OCT	1	170	1	15	91	35	1	160	1	20	88	31	0
NOV	1	130	1	6	95	30	1	410	1	20	95	95	0
DEC	1	120	1	10	92	23	1	120	1	10	92	23	0
TOTAL	15	-	13	-	-		15	-	13	-	-		322
AVERAGE	-	110	-	10	91	24	-	207	-	17	92	49	-

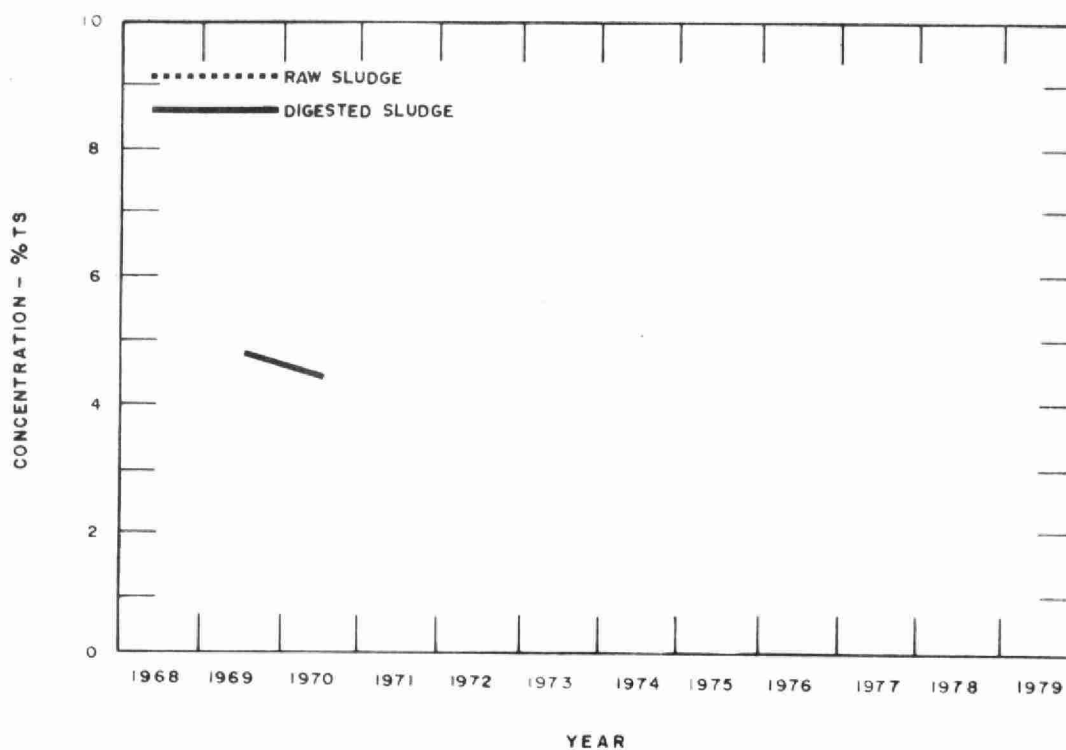
NOTE - n is the number of samples taken

AERATION

MONTH	AVG DAILY FLOW mil gal	AERATION INF.		SECONDY. EFF.		MLSS CONCN mg/l	F/M lb BOD lb MLSS	AIR USED 1000 cu ft lb BOD	WASTE SLUDGE lb/DAY
		BOD	SS	BOD	SS				
		mg/l	mg/l	mg/l	mg/l				
JAN	.6	80	80	15	30	3350	.08	11.4	390
FEB	.7	70	70	5	20	2900	.08	10.7	390
MAR	.8	100	70	10	15	3900	.10	6.6	420
APR	1.3	63	90	5	15	3660	.10	6.3	400
MAY	.9	65	85	28	10	-	-	13.8	-
JUNE	.7	-	-	-	-	-	-	-	-
JULY	.7	40	70	16	20	-	-	27.4	-
AUG	.6	70	80	24	10	-	-	16.7	-
SEPT	.7	75	70	24	5	-	-	13.6	-
OCT	.7	100	90	13	15	-	-	7.3	-
NOV	.8	220	550	28	20	-	-	1.7	-
DEC	.7	75	70	20	10	-	-	12.7	-
TOTAL	-	-	-	-	-	-	-	-	-
AVERAGE	.8	85	118	16	15	3450	.09	11.7	400



DIGESTION



SLUDGE DIGESTION and DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME 10 ⁵ gal	TOTAL SOLIDS %	VOL SOLIDS %	VOLUME 10 ⁵ gal	TOTAL SOLIDS %	VOL SOLIDS %	VOLUME 10 ⁵ gal	TOTAL SOLIDS %	DEWATERED cu yd	LIQUID cu yd
JAN	1.6	-	-	.3	-	-	1.3	-	-	174
FEB	1.4	-	-	.2	-	-	1.3	-	-	114
MAR	1.6	-	-	.4	-	-	1.2	-	-	264
APR	1.5	-	-	.5	-	-	1.0	-	-	282
MAY	1.5	-	-	.4	5.0	-	1.1	-	-	239
JUNE	1.4	-	-	.5	-	-	.8	-	-	281
JULY	1.4	-	-	.4	5.6	-	.9	-	-	270
AUG	1.4	-	-	.6	.8	-	.9	-	-	336
SEPT	1.4	-	-	.9	-	-	1.1	-	-	201
OCT	1.5	-	-	.6	5.0	-	.9	-	-	342
NOV	1.5	-	-	.6	5.6	-	1.2	-	-	332
DEC	1.8	-	-	.4	-	-	1.4	-	-	233
TOTAL	18.0	-	-	5.8	-	-	13.1	-	-	3068
AVERAGE	1.5	-	-	.5	4.4	-	1.0	-	-	256

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